Journal of Fermentation and Bioengineering

VOLUME 77 · 1994

THE SOCIETY FOR FERMENTATION AND BIOENGINEERING, JAPAN

JOURNAL OF FERMENTATION AND BIOENGINEERING

Chairman: Shiro NAGAI

International Editors: Tadayuki IMANAKA (Editor in Chief, Japan)
Bo MATTIASSON (Sweden, Europe)
Peter L. ROGERS (Australia, Oceania)
Henry Y. WANG (USA, America)

Editorial Board:

John P. BARFORD (Australia)
Amaret BHUMIRATANA (Thailand)
Ho Nam CHANG (South Korea)
Howard CHASE (UK)
Cha Yong CHOI (South Korea)
Charles L. COONEY (USA)
Kenji FURUKAWA (Japan)
Olle HOLST (Sweden)
Wei-Shou HU (USA)
Shih-Yow HUANG (R. O. China)
Hiroshi IMANAKA (Japan)
Mahendra K. JAIN (USA)
Shigeo KATOH (Japan)
Akira KIMURA (Japan)
Katsuhiko KITAMOTO (Japan)
Takeshi KOBAYASHI (Japan)
Tohru KODAMA (Japan)
Yourong LI (P. R. China)
I. S. MADDOX (New Zealand)
Yoshikatsu MUROOKA (Japan)
Tohru NAGASAWA (Japan)
Takuya NIHIRA (Japan)
POH Chit Laa (Singapore)
Dewey RYU (USA)
Rolf D. SCHMID (Germany)
Sakayu SHIMIZU (Japan)
Suteaki SHIOYA (Japan)
Makoto SHODA (Japan)
Kenji SONOMOTO (Japan)
Masahiro TAKAGI (Japan)
Hideo TANAKA (Japan)
Ir. Johannes TRAMPER (Netherlands)
Mitsuyoshi UEDA (Japan)
Itaru URABE (Japan)
Eric VANDAMME (Belgium)

THE SOCIETY FOR FERMENTATION AND BIOENGINEERING, JAPAN

% Faculty of Engineering, Osaka University,
2–1 Yamadaoka, Suita,
Osaka 565, Japan

Journal of Fermentation and Bioengineering

CONTENTS
VOLUME 77 • 1994

ORIGINALS

Cloning and Nucleotide Sequence of a Gene Conferring Ability to Grow at a Low Temperature on *Saccharomyces cerevisiae* Tryptophan Auxotrophs. Daizo Kawamura, Ichiro Yamashita, Osamu Nimi, and Akio Toh-e 1- 9

Colorimetric Measurement of Angiotensin I-Converting Enzyme Activity Using Bilirubin Oxidase-Catalyzed Oxidative Decarboxylation. Hitosi Agematu, Hiroyuki Chiba, Norio Shibamoto, Takeo Yoshioka, Takashi Shin, and Sawao Murao 10- 12

NAD(P)H Regeneration Using Ethanol as an Energy Source in Baker's Yeast-Mediated Bioreduction. Tadashi Kometani, Yasufumi Morita, Hideyuki, Furui, Hidefumi Yoshii, and Ryuichi Matsuno 13- 16

Purification, Characterization and Partial Amino Acid Sequences of a Novel Cephalosporin-C Deacetylase from *Bacillus subtilis*. Akio Takimoto, Kenji Mitsushima, Shigeo Yagi, and Takayasu Sonoyama 17- 22

Two Distinct Molecular Forms of Phytase from *Klebsiella aerogenes*: Evidence for Unusually Small Active Enzyme Peptide. Suhas M. Tambe, Gangadhar S. Kaklij, Shashikant M. Kelkar, and Lalit J. Parekh 23- 27

Hydrocarbon Pseudosolubilizing and Emulsifying Proteins Produced by *Pseudomonas cepacia* N1. Pranab Goswami, Ajit K. Hazarika, and H. D. Singh ... 28- 31

Biotransformation of Lactose to Galactitol. Syed Muniruzzaman, Hiromichi Itoh, Akira Yoshino, Takeshi Katayama, and Ken Izumori 32- 35

Acceleration of Cell Growth and Ester Formation by Ultrasonic Wave Irradiation. Kazuo Matsuura, Masato Hirotsune, Yataro Nunokawa, Masanori Satoh, and Keisuke Honda 36- 40

Continuous Beer Fermentation by High Cell-Density Culture of Bottom Brewer's Yeast. Mitsuyasu Okabe, Atsushi Oda, Yong Soo Park, Katsuhiro Noguchi, Takanori Okamoto, and Shunsuke Mitsui 41- 45

Continuous Culture of CHO-K1 Cells Producing Thrombomodulin and Estimation of Culture Conditions. Masaaki Ogata, Yasumasa Marumoto, Kiyomoto Oh-i, Shin Shimizu, and Shigeo Katoh 46- 51

Continuous Production of Human Erythropoietin by Immobilized Recombinant L-929 Cells. Shuji Terashima, Masamichi Kamihira, Tatsuya Ogawa, Masanao Ohno, Shinji Iijima, and Takeshi Kobayashi 52- 56

Development of Two Stage Culture Process by Optimization of Inorganic Salts for Improving Catharanthine Production in Hairy Root Cultures of *Catharanthus roseus*. Kyung-Hee Jung, Sang-Soo Kwak, Cha-Yong Choi, and Jang Ryol Liu 57- 61

Changes in Microflora and Biochemical Composition during the *Baceman* Stage of Traditional Indonesian *Kecap* (Soy Sauce) Production. Wilfred F. M. Röling, Kris H. Timotius, A. Budhi Prasetyo, Adriaan H. Stouthamer, and Henk W. van Verseveld 62- 70

Simultaneous Release and Purification of Gene Product in an Aqueous Two-

3 827HI XL 1445
12/94 31249-203

Phase System. Osamu Ariga, Isamu Miyakawa, Taro Aota, and Yoshiki Sano 71- 74
Enhanced Metal-Affinity Partitioning of Genetically Engineered Hirudin Variants in Polyethylene Glycol/Dextran Two-Phase Systems. Bong Hyun Chung, Jung Hoon Sohn, Sang-Ki Rhee, Yong Keun Chang, and Young Hoon Park 75- 79
Fractionation of IgG Fragments Using Reversed Micellar Extraction. Masamichi Kamihira, Hidetoshi Yanagisawa, Katsuroku Takahashi, and Hiroshi Takeuchi 80- 84
Liquefaction and Gasification during Anaerobic Digestion of Coffee Waste by Two-Phase Methane Fermentation with Slurry-State Liquefaction. Ikbal, Kenji Kida, and Yorikazu Sonoda 85- 89
Genetic Design of a Gene for Human Metallothionein II and Its Expression as an Active Fusion Protein in *Escherichia coli*. Mitsuo Yamashita, Hidehumi Kuwata, Hidehiko Murakami, and Yoshikatsu Murooka 113-118
Introduction of a Feed Back Resistant α-Isopropylmalate Synthase Gene of *Saccharomyces cerevisiae* into Sake Yeast. Tetsuyoshi Suizu, Kyoko Kotani, Katsuhiro Yasui, Eiji Ichikawa, Akitsugu Kawato, and Satoshi Imayasu ... 119-124
A DNA Construct Useful for Specific Chromosome Loss in *Saccharomyces cerevisiae*. Hideki Kawasaki and Kozo Ouchi 125-130
Isolation and Partial Characterization of Carotenoid Underproducing and Overproducing Mutants from an Extremely Thermophilic *Thermus thermophilus* HB27. Takayuki Hoshino, Yuko Yoshino, Elvira D. Guevarra, Sayuri Ishida, Tomoko Hiruta, Ryouji Fujii, and Tadaatsu Nakahara 131-136
Possible Use of a Polymerase Chain Reaction Method for Specific Detection of *Salmonella* in Beef. Hau-Yang Tsen, Jiing-Wern Liou, and Chien-Ku Lin 137-143
Identification of Algal Transformation Products from Alicyclic Ketones. Fumiki Yoshizako, Atsuo Nishimura, and Mitsuo Chubachi 144-147
Biotransformation of Oleic Acid by *Alcaligenes* sp. 5-18, a Bacterium Tolerant to High Concentrations of Oleic Acid. Nobuyoshi Esaki, Shigeki Ito, Wolfgang Blank, and Kenji Soda 148-151
Purification and Characterization of the Lipase from *Serratia marcescens* Sr41 8000 Responsible for Asymmetric Hydrolysis of 3-Phenylglycidic Acid Esters. Hiroaki Matsumae and Takeji Shibatani 152-158
Batch Production of High-Content Fructo-Oligosaccharides from Sucrose by the Mixed-Enzyme System of β-Fructofuranosidase and Glucose Oxidase. Jong Won Yun, Min Gyu Lee, and Seung Koo Song 159-163
Extracellular Production of Palmitoleic Triglycerides by a Yeast, *Trichosporon*. Takashi Yagi, Akiko Hatano, Taisuke Nakanishi, Takushi Hatano, and Sakuzo Fukui 164-168
Enhancement of Ethanol Formation by Immobilized Yeast Containing Iron Powder or Ba-Ferrite Due to Eddy Current or Hysteresis. Yasuzo Sakai, Yuichi Tamiya, and Fujio Takahashi 169-172
Immobilization of Trichloroethylene-Degrading Bacterium, *Methylocystis* sp. Strain M in Different Matrices. Hiroo Uchiyama, Osami Yagi, Kazuhito Oguri, and Etsuo Kokufuta 173-177
Stimulation of Emergence of Root Apical Meristems in Horseradish Hairy Root by Auxin Supplementation and Its Kinetic Model. Yutaka Nakashimada, Nobuyuki Uozumi, and Takeshi Kobayashi 178-182
Production of Protease Using Wastewater from the Manufacture of *Shochu*.

Shigeru Morimura, Kenji Kida, and Yorikazu Sonoda 183-187

Anaerobic Treatment of Wastewater with High Salt Content from a Pickled-Plum Manufacturing Process. Kouhei Tanemura, Kenji Kida, Ikbal, Juichi Matsumoto, and Yorikazu Sonoda 188-193

Efficient Production of Gene Products by Repeated Fed-Batch Fermentation Using Multiple Fermentors. Kiyoshi Fujioka and Kazuyuki Shimizu 194-198

Cloning, Sequencing, and Overexpression in *Escherichia coli* of a Sarcosine Oxidase-Encoding Gene Linked to the *Bacillus* Creatinase Gene. Koji Suzuki, Hitoshi Sagai, Shigeyuki Imamura, and Masanori Sugiyama 231-234

Expression of the Carboxymethylcellulase Gene, *CMC1*, from *Cryptococcus flavus* in *Saccharomyces cerevisiae*. Takushi Hatano, Tsunehiro Komura, Zhifeng Cui, Daisuke Mochizuki, Tokichi Miyakawa, Hiroaki Matsuzaki, and Sakuzo Fukui 235-238

Purification and Properties of Cellodextrin Phosphorylase from *Clostridium thermocellum*. Motoo Arai, Keijitsu Tanaka, and Takashi Kawaguchi ... 239-242

Selective Isolation of β-Amylase Derepressed Mutants of *Bacillus acidopullulyticus*. Mei-Jen Wang and Roch-Chui Yu 243-247

Constitutive Mutants for Dextransucrase from *Leuconostoc mesenteroides* NRRL B-512F. Naoko Mizutani, Masahiko Yamada, Kenichiro Takayama, and Makoto Shoda 248-251

Random Mutagenesis of Glutamine Synthetase from *Escherichia coli*: Correlation between Structure, Activity, and Fitness. Wei-Zhong Xu, Jun Fukuhara, Keizo Yamamoto, Tetsuya Yomo, and Itaru Urabe 252-258

Immobilization of Cyclodextrin Glucanotransferase on Capillary Membrane. Takeshi Okada, Masaaki Ito, and Ken Hibino 259-263

Intermolecular Transglycosylating Reaction of Cyclodextrin Glucanotransferase Immobilized on Capillary Membrane. Takeshi Okada, Masaaki Ito, and Ken Hibino 264-267

Immobilization of γ-Glutamyl Transpeptidase, a Membrane Enzyme, in Gel Beads *via* Liposome Entrapment. Takeshi Gotoh, Masayuki Shidara, Tsuyoshi Iwanaga, Ken-ichi Kikuchi, and Mitsunori Hozawa 268-273

On the Importance of Calcium and Magnesium Ions in Yeast Sporulation. Tetsuyoshi Suizu, Hiroko Tsutsumi, Akitsugu Kawado, Kousaku Murata, and Satoshi Imayasu 274-276

Plantaricin-149, a Bacteriocin Produced by *Lactobacillus plantarum* NRIC 149. Takeo Kato, Tsukasa Matsuda, Emiko Ogawa, Hironori Ogawa, Hiroshi Kato, Umeyuki Doi, and Ryo Nakamura 277-282

Hydrolysis Kinetics of Olive Oil with Lipase in a Transfer Cell. Yoshinobu Kawano, Mie Kawasaki, Koichiro Shiomori, Yoshinari Baba, and Tadashi Hano 283-287

Kinetic Study of Electrodialysis of Acetic Acid and Phosphate in Fermentation Broth. Shu-Ting Zhang and Kiyoshi Toda 288-292

Physical Factors Influencing Microbial Interactions and Biochemical Changes during the *Baceman* Stage of Indonesian *Kecap* (Soy Sauce) Production. Wilfred F. M. Röling, Kris H. Timotius, Adriaan H. Stouthamer, and Henk W. van Verseveld 293-300

An Oxygen Supply Strategy for the Large-Scale Production of Tissue Plasminogen Activator by Microcarrier Cell Culture. Mutsumi Takagi, Hiroshi Okumura, Takashi Okada, Nobuyuki Kobayashi, Takao Kiyota, and Kazuo Ueda 301-306

Anaerobic Treatment of Wastewater from a Food-Manufacturing Plant with a

Low Concentration of Organic Matter and Regeneration of Usable Pure Water. Kouhei Tanemura, Kenji Kida, Motowo Teshima, and Yorikazu Sonoda 307-311

Nucleotide Sequence of the Neutral Protease Gene (*nprL*) from *Lactobacillus* sp. and Characterization of the Enzyme. Takuya Maeda, Shigeru Kawano, Masahiro Takagi, and Tadayuki Imanaka 339-346

Nucleotide Sequence and Possible Functional Mechanism of the Transcriptional Activator Gene (*preL*) for Neutral Protease from *Lactobacillus* sp. Takuya Maeda, Shigeru Kawano, Masahiro Takagi, and Tadayuki Imanaka 347-351

Isolation of Resistant Mutants against Carotenoid Biosynthesis Inhibitors for a Green Alga *Haematococcus pluvialis*, and Their Hybrid Formation by Protoplast Fusion for Breeding of Higher Astaxanthin Producers. Agus Eko Tjahjono, Toshihide Kakizono, Yachiyo Hayama, Naomichi Nishio, and Shiro Nagai 352-357

Properties of a New Strain of *Nitrosomonas* Isolated from an Aerobic Biofilm in a Domestic Sewage-Treatment System. Hitoshi Ohara, Tomoko Noguchi, Hisato Tokumaru, Shuhei Kohno, and Tateo Yamanaka 358-362

Purification and Characterization of Endoglucanase and Exoglucanase Components from *Trichoderma viride*. Dong Won Kim, Young Kyu Jeong, Young Hun Jang, and Jae Kuk Lee 363-369

Purification and Characterization of a Pectin-Releasing Enzyme Produced by *Kluyveromyces wickerhamii*. Shinobu Yoshitake, Takeshi Numata, Tohoru Katsuragi, Roque A. Hours, and Takuo Sakai 370-375

Control of Secretory Production of Human Lysozyme from *Saccharomyces cerevisiae* by Incubation Temperature and Phosphate Concentration. Emi Hiraoka, Masatoshi Murai, Jyun-ichi Yano, Masanori Bun-ya, Satoshi Harashima, and Yasuji Oshima 376-381

Microbial Production of 6-Hydroxynicotinic Acid, an Important Building Block for the Synthesis of Modern Insecticides. Byungserk Hurh, Mikiko Ohshima, Tsuneo Yamane, and Toru Nagasawa 382-385

Production of 1-Kestose by *Scopulariopsis brevicaulis*. Hiroyuki Takeda, Kyoichi Sato, Shinichi Kinoshita, and Hiroshi Sasaki 386-389

Culture Conditions for Production and Purification of Bioabsorbent from *Alcaligenes latus* B-16. Yasuhiro Nohata and Ryuichiro Kurane 390-393

A Low-Serum Medium with BSA and Ferrous Sulfate for the Production of Tissue Plasminogen Activator by Human Embryo Lung Cells. Mutsumi Takagi and Kazuo Ueda 394-399

Influence of Prebrining Treatments on Microbial and Biochemical Changes during the *Baceman* Stage in Indonesian *Kecap* (Soy Sauce) Production. Wilfred F. M. Röling, Frank P. Schuurmans, Kris H. Timotius, Adriaan H. Stouthamer, and Henk W. van Verseveld 400-406

Hydrolysis of Starchy Materials by Repeated Use of an Amylase Immobilized on a Novel Thermo-Responsive Polymer. Kazuhiro Hoshino, Masafumi Katagiri, Masayuki Taniguchi, Toshisuke Sasakura, and Michihiro Fujii ... 407-412

Nitrogen Pollution of Leachate at a Sea-Based Solid Waste Disposal Site and Its Nitrification Treatment by Immobilized Acclimated Nitrifying Sludge. Kenji Furukawa, Soo-Lim Ryu, Masanori Fujita, and Isao Fukunaga 413-418

Cloning and Nucleotide Sequence of a *hsp70* Gene from *Streptomyces griseus*. Yuji Hatada, Hidenori Shinkawa, Kazuyuki Kawamoto, Haruyasu Kinashi, and Osamu Nimi 461-467

Overexpression and Secretion of Cellulolytic Enzymes by δ-Sequence-Mediated

Multicopy Integration of Heterologous DNA Sequences into the Chromosomes of *Saccharomyces cerevisiae.* Daisuke Mochizuki, Kohji Miyahara, Dai Hirata, Hiroaki Matsuzaki, Takushi Hatano, Sakuzo Fukui, and Tokichi Miyakawa 468–473

Formation of Autodiploid Strains in *Aspergillus niger* and Their Application to Citric Acid Production from Starch. Somsak Sarangbin, Satoshi Morikawa, Kohtaro Kirimura, and Shoji Usami 474–478

Colorimetric Measurement of Total Activity of Leucine Aminopeptidase and Arylamidase in Serum Using Laccase-Catalyzed Oxidative Decarboxylation. Hitosi Agematu, Takashi Nakashima, Norio Shibamoto, Takeo Yoshioka, Takashi Shin, and Sawao Murao 479–482

Comparison of Acid-Stable α-Amylase Production by *Aspergillus kawachii* in Solid-State and Submerged Cultures. Shigetoshi Sudo, Takeaki Ishikawa, Kazuo Sato, and Toshiteru Oba 483–489

Lipase Production of *Aspergillus oryzae.* Kunio Ohnishi, Yohko Yoshida, and Junichi Sekiguchi 490–495

Action of Exo- and Endo-Type Cellulases from *Irpex lacteus* on *Valonia* Cellulose. Eiichi Hoshino, Masafumi Nomura, Mitsuo Takai, Mitsuo Okazaki, Kazutosi Nisizawa, and Takahisa Kanda 496–502

Endocellular Fatty Acid Composition during Batch Growth and Sporulation of *Bacillus thuringiensis kurstaki.* Gerald E. Rowe and Argyrios Margaritis... 503–507

Stimulation of the Rate of L-Lactate Fermentation Using *Lactococcus lactis* IO-1 by Periodic Electrodialysis. Phenjun Vonktaveesuk, Michio Tonokawa, and Ayaaki Ishizaki 508–512

Production of New Tricarboxylic Acid Anhydrides from Stearic Acid by *Pseudomonas cepacia* A-1419. Shigeki Itoh, Nobuyoshi Esaki, Koichi Masaki, Wolfgang Blank, and Kenji Soda 513–516

Measurement of Viable Plant Cell and Protoplast Concentrations with Specialized Fluorometer. Hideki Aoyagi and Hideo Tanaka 517–521

Determination of Volumetric Oxygen Transfer Coefficient by Off-Gas Analysis. Koichi Fujie, Katsumi Tsuchiya, and Liang-Shih Fan..... 522–527

A Kinetic Assessment of Substantial Oxidation by *Sulfolobus acidocaldarius* in Pyrite Dissolution. Virote Boonamnuay Vitaya, Jun-ichi Koizumi, and Kiyoshi Toda 528–534

Role of Glycogen in Acetate Uptake and Polyhydroxyalkanoate Synthesis in Anaerobic-Aerobic Activated Sludge with a Minimized Polyphosphate Content. Wen-Tso Liu, Takashi Mino, Kazunori Nakamura, and Tomonori Matsuo 535–540

pH-Mediated Control Methods for Continuous Ethanol Fermentation Using *Zymomonas mobilis.* Ayaaki Ishizaki, Sudarut Tripetchkul, Michio Tonokawa, Zhong-Ping Shi, and Kazuyuki Shimizu 541–547

Identification of the Metabolic Intermediates of Phthalate by Tn*5* Mutants of *Pseudomonas testosteroni* and Analysis of the 4,5-Dihydroxyphthalate Decarboxylase Gene. Jong-Hoon Lee, Toshio Omori, and Tohru Kodama 583–590

A Novel 7-β-(4-Carboxybutanamido)-Cephalosporanic Acid Acylase Isolated from *Pseudomonas* Strain C427 and Its High-Level Production in *Escherichia coli.* Yoshinori Ishii, Yoshimasa Saito, Takao Fujimura, Takao Isogai, Hitoshi Kojo, Mitsuo Yamashita, Mineo Niwa, and Masanobu Kohsaka ... 591–597

Affinity Labelling of Cephalosporin C Acylase from *Pseudomonas* sp. N176 with a Substrate Analogue, 7β-(6-Bromohexanoylamido)cephalosporanic Acid. Yoshinori Ishii, Yoshimasa Saito, Hitoshi Sasaki, Fumiaki Uchiyama,

Masako Hayashi, Sachiko Nakamura, and Mineo Niwa 598–603

Chemical Modification and Site-Directed Mutagenesis of Tyrosine Residues in Cephalosporin C Acylase from *Pseudomonas* Strain N176. Timothy J. Nobbs, Yoshinori Ishii, Takao Fujimura, Yoshimasa Saito, and Mineo Niwa 604–609

Integration of the Mutated Biotin Biosynthetic Genes to the Chromosome of a *d*-Biotin-Producing Strain of *Serratia marcescens*. Naoki Sakurai, Yuji Imai, Saburo Komatsubara, and Tetsuya Tosa 610–616

Purification and Characterization of an Extracellular Chitosanase Produced by *Amycolatopsis* sp. CsO-2. Shoji Okajima, Akikazu Ando, Hirofumi Shinoyama, and Takaaki Fujii 617–620

Isolation and Characterization of Salt-Tolerant Glutaminases from Marine *Micrococcus luteus* K-3. Mitsuaki Moriguchi, Kenji Sakai, Ryoji Tateyama, Yoichi Furuta, and Mamoru Wakayama 621–625

A New Biosynthetic Pathway of Porphyrins from Isopropanol. Masahiro Kajiwara, Minoru Mizutani, Reiko Matsuda, Ken-ichiro Hara, and Ichiro Kojima 626–629

***Enterobacter cloacae* A105, Isolated from the Surface of Root Nodules of *Astragalus sinicus* cv. Japan, Stimulates Nodulation by *Rhizobium huakuii* bv. renge.** Yong Xu, Akira Yokota, Hirokazu Sanada, Makoto Hisamatsu, Mineo Araki, Hyeon-Je Cho, Tsutomu Morinaga, and Yoshikatsu Murooka 630–635

Adsorption of Bacterial Cells to Crystal Particles of Heavy Metals: Role of Electrostatic Interaction. Naoto Yoshida and Yoshikatsu Murooka 636–641

Effect of Mixing and Mass Transfer Conditions on Gellan Production by *Auromonas elodea*. Éric Dreveton, Frédéric Monot, Daniel Ballerini, Jacqueline Lecourtier, and Lionel Choplin 642–649

Scaleup of Peroxidase Production by *Arthromyces ramosus* Based on Analysis of Fluid Velocity Distribution. Hideo Tsujimura, Masamitsu Takaya, Kenji Katano, Nobuya Matsumoto, Yong Soo Park, and Mitsuyasu Okabe 650–654

On-Line Determination of Optimum Time for Switching from Growth Phase to Production Phase in Tissue Plasminogen Activator Production in a Microcarrier Cell Culture. Mutsumi Takagi and Kazuo Ueda 655–658

Prediction of the Concentration of Several Constituents in a Mouse-Mouse Hybridoma Culture by Near Infrared Spectroscopy. Takuo Yano and Masami Harata 659–662

Fuzzy Neural Network for the Control of High Cell Density Cultivation of Recombinant *Escherichia coli*. Kaiming Ye, Sha Jin, and Kazuyuki Shimizu 663–673

A Novel Method of Enumerating *Nocardia amarae* in Foaming Activated Sludge. Masanori Fujita, Keisuke Iwahori, and Hironori Taki 674–678

Treatment of Low Strength Soluble Wastewaters in UASB Reactors. Mario T. Kato, Jim A. Field, Robbert Kleerebezem, and Gatze Lettinga 679–686

NOTES

Anaerobic Treatment of Distillery Wastewater from Barley-*Shochu* Making by UASB. Kenji Kida, Kouhei Tanemura, Yorikazu Sonoda, and Sumiko Hikami 90– 93

Acid-Stable and Thermostable α-Amylase from *Bacillus licheniformis* α. Yoshiyuki Takasaki, Seigo Furutani, Sachio Hayashi, and Kiohisa Imada... 94– 96

Purification and Some Properties of Citrate Synthase from a Nitrite-Oxidizing Chemoautotroph, *Nitrobacter agilis* ATCC 14123. Reiji Takahashi,

Kazuhito Usui, Takashi Sakuraba, and Tatsuaki Tokuyama 97- 99
Purification and Characterization of L-Fucose Dehydrogenase from *Agrobacterium tumefaciens* K-28. Hiromichi Itoh, Terumi Miyoshi, Akira Yoshino, Keiko Shiragami, and Ken Izumori 100-102
Production and Release of Anthraquinone Pigments by Hairy Roots of Madder (*Rubia tinctorum* L.) under Improved Culture Conditions. Masahiro Kino-oka, Koji Mine, Masahito Taya, Setsuji Tone, and Takahito Ichi 103-106
Rapid Assay of Cell Activity of Yeast Cells. Fukiko Nishimoto and Shiro Yamashoji 107-108
Application of Thermostable Xylanases from *Humicola* sp. for Pulp Improvement. Roberto Da Silva, Dong K. Yim, and Yong K. Park 109-111
Molecular Cloning of Thermostable β-Glucosidase Gene from a Thermophilic Anaerobe NA10 and Its High Expression in *Escherichia coli*. Hiroyuki Sota, Patthra Arunwanich, Osamu Kurita, Nobuyuki Uozumi, Hiroyuki Honda, Shinji Iijima, and Takeshi Kobayashi 199-201
Inherent G418-Resistance in Hybridization of Industrial Yeasts. Toyohiko Yamazaki and Hideo Nonomura 202-204
Characterization of a Dicarboxylic Acid-Producing Mutant of the Yeast *Candida tropicalis*. Haruyuki Atomi, Chi Yu, Akihiro Hara, Toru Matsui, Nobuko Naito, Naomi Kamasawa, Masako Osumi, Mitsuyoshi Ueda, and Atsuo Tanaka 205-207
Regeneration of Plantlets from Celery (*Apium graveolens* L.) Callus Using a Fermentor. Akihiro Okamoto, Hiroshi Sakurazawa, and Keiichi Arikawa ... 208-211
Improvement of a Fixed Bed Bioreactor for Plant Cell Culture. Nobuo Nagai, Iwao Kuroiwa, Takahisa Kanda, and Mitsuo Okazaki 212-214
Influence of Medium Constituents on Enhancement of Pigment Production by Batch Culture of Red Beet Hairy Roots. Masahito Taya, Ken Yakura, Masahiro Kino-oka, and Setsuji Tone 215-217
Fermentation of Paddy Malt Mash to Ethanol by Mixed Cultures of *Saccharomyces cerevisiae* and *Zymomonas mobilis* ZM4 with Penicillin G. Renu Agrawal and Sadali C. Basappa 218-220
Relation between Critical Disk Speed for Foam-Breaking of Rotating-Disk Mechanical Foam-Breakers and Foaming Characteristics of Solutions. Satoshi Takesono, Masayuki Onodera, Kazuaki Yamagiwa, Akihiko Mori, and Akira Ohkawa 221-223
Influences of Nonuniform Activity Distributions on the Apparent Maximum Reaction Rate and Apparent Michaelis Constant of Immobilized Enzyme Reactions. Fumihide Shiraishi and Hiromitsu Miyakawa 224-228
Nucleotide Sequence of the Shikimate Kinase Gene (*aroI*) of *Bacillus subtilis*. Akitaka Nakane, Kou-ichiro Ogawa, Kouji Nakamura, and Kunio Yamane 312-314
Nucleotide Sequence of the Gene for Monoamine Oxidase (*maoA*) from *Escherichia coli*. Hiroyuki Azakami, Mitsuo Yamashita, Jung-Hyeob Roh, Hideyuki Suzuki, Hidehiko Kumagai, and Yoshikatsu Murooka 315-319
Production, Purification and Characterization of a Tannase from *Aspergillus niger* LCF 8. Chantal Barthomeuf, Françoise Regerat, and Henri Pourrat ... 320-323
Transesterification of Ethylparaben by Free and Entrapped Cells of *Pseudomonas cepacia*. Kenichi Horiuchi, Kazuhiro Morimoto, Kazunori Kobashi, Toshiro Mitsui, and Rikisaku Suemitsu 324-325
Effect of Steam Explosion Treatment on Enzymatic Hydrolysis of Palm Cake and Fiber as Solid Wastes and Natural Resources. Susumu Oi, Keiko

Matsuzaki, Toshio Tanaka, Masaru Iizuka, Makoto Taniguchi, and Poonsuk Prasertsan 326–328

Itaconic Acid Production Using an Air-Lift Bioreactor in Repeated Batch Culture of *Aspergillus terreus*. Yong Soo Park, Mitsuru Itida, Noriyasu Ohta, and Mitsuyasu Okabe 329–331

Indirect Estimation of Cell Mass and Substrate Concentration Using a Computer-Coupled Mass Spectrometer. Soo Wan Nam and Jung Hoe Kim 332–334

Anaerobic Digestion of Coffee Waste by Two-Phase Methane Fermentation with Slurry-State Liquefaction. Kenji Kida, Ikbal, Motowo Teshima, Yorikazu Sonoda, and Kouhei Tanemura 335–338

Liberation of Sucrose-Hydrolyzing Enzymes from Cells by the *zliS* Gene Product That Mediates Protein Secretion in *Zymomonas mobilis*. Yuji Oda, Hideshi Yanase, Nobuo Kato, and Kenzo Tonomura 419–422

Overproduction of Carotenoids in *Thermus thermophilus*. Takayuki Hoshino, Ryouji Fujii, and Tadaatsu Nakahara 423–424

Production of Poly-D-3-Hydroxybutyric Acid from Carbon Dioxide by a Two-Stage Culture Method Employing *Alcaligenes eutrophus* ATCC 17697^T. Kenji Tanaka and Ayaaki Ishizaki 425–427

Selection and Hybridization of Wine Yeasts for Improved Winemaking Properties: Fermentation Rate and Aroma Productivity. Takashi Shinohara, Kotaro Saito, Fujitoshi Yanagida, and Shoji Goto 428–431

Fermentation Characteristics of Hybrids between the Cryophilic Wine Yeast *Saccharomyces bayanus* and the Mesophilic Wine Yeast *Saccharomyces cerevisiae*. Munekazu Kishimoto 432–435

Microbial Production of Squalene by a Nicotinic Acid-Resistant Mutant Derived from *Fusarium* sp. No. 5-128B. Takahira Ogawa, Ichiro Kojima, Norio Takeda, and Hideo Fukuda 436–438

Solubilization of a Novel Isoflavone Glycoside-Hydrolyzing β-Glucosidase from *Lactobacillus casei* subsp. *rhamnosus*. Shigeki Matsuda, Fumihiro Norimoto, Yunosuke Matsumoto, Riichiro Ohba, Yuji Teramoto, Naokazu Ohta, and Seinosuke Ueda 439–441

Insulin Delivery System Based on an Affinity Chemical Valve. Kanji Tomioka, Hideki Fukuda, and Hiroshi Taniguchi 442–444

Computer-Aided On-Line Monitoring of Physiological Variables in Suspended Cell Cultures of *Perilla frutescens* in a Bioreactor. Jian-Jiang Zhong, Konstantin B. Konstantinov, and Toshiomi Yoshida 445–447

Development of an On-Line Glucoamylase Monitoring System. Yasuhiko Imai, Masaru Suzuki, Manabu Masamoto, and Kouzo Nagayasu 448–449

Removal of PO_4 and NH_4 from Wastewaters by UASB Methanogenic Fermentation. Yong-Jin Chang and Naomichi Nishio 450–452

Purification of Extracellular Lipases from *Trichosporon fermentans* WU-C12. Jiacong Chen, Susumu Shimura, Kohtaro Kirimura, and Shoji Usami 548–550

Purification and Some Properties of Dextransucrase from *Streptococcus bovis* 148. Katsuhiro Takagi, Ryo Ioroi, Tai Uchimura, Michio Kozaki, and Kazuo Komagata 551–553

Purification and Characterization of an Alkaline Protease from *Oerskovia xanthineolytica* TK-1. Kazuo Saeki, Junko Iwata, Yasuo Watanabe, and Youichi Tamai 554–556

Purification and Some Properties of NAD(P)H Dehydrogenase from *Saccharomyces cerevisiae*: Contribution to Glycolytic Methylglyoxal Pathway. Yoshiharu Inoue and Akira Kimura 557–561

Stimulatory Effects of Certain Amino Acids, Sugars, Organic Acids, Nucleic Acids and Metals on Nitrate Utilization by Alkalophilic *Bacillus*. Yoko

Ikura and Koki Horikoshi 562-564

Effect of Amylase Accumulation on Hydrogen Production by *Clostridium beijerinckii*, Strain AM21B. Fumiaki Taguchi, Naoki Mizukami, Katsushige Hasegawa, Tatsuo Saito-Taki, and Masayoshi Morimoto 565-567

Induction of Yeast Sporulation by Lysine-Related Compounds and Glutathione in Nutrition-Rich Conditions. Tetsuyoshi Suizu, Hiroko Tsutsumi, Akitsugu Kawado, Satoshi Imayasu, Tomoko Inose, Akira Kimura, and Kousaku Murata 568-571

Degradation of Unsaturated Polysaccharide Derived from Acidic Polysaccharide of *Fusarium* sp. M7-1 by a Bacterium Isolated from Soil. Nahrowi Ramli, Kaoru Takegawa, and Shojiro Iwahara 572-574

Photobioreactor with Photosynthetic Bacteria Immobilized on Porous Glass for Hydrogen Photoproduction. Anatoly A. Tsygankov, Yoshiki Hirata, Masato Miyake, Yasuo Asada, and Jun Miyake 575-578

Modelling of the Glucosinolate Content in Solid-State Fermentation of Rapeseed Meal with Fuzzy Logic. Jan P. Smits, Rob J. J. Janssens, Pim Knol, and Jan Bol 579-581

Transport of Sucrose by *Saccharomyces cerevisiae*. Patrick K. Mwesigye and John P. Barford 687-690

Crystallization and Preliminary X-Ray Diffraction Studies of Bacterial Alginate Lyase. Bunzo Mikami, Tomohiro Hisano, Tetsuo Yamashita, Tomoko Inose, Masahiro Takagi, Kenji Sakaguchi, Akira Kimura, Tadayuki Imanaka, and Kousaku Murata 691-692

Influence of Nitrilotriacetic Acid and 8-Hydroxyquinoline on the Production of Citric Acid from Molasses Using *Aspergillus niger*. Kayode O. Esuoso ... 693-695

Microbial Synthesis of 5-Fluorouridine Monophosphate and 5-Fluoro-2′-Deoxyuridine Monophosphate. Ken-ichi Fujita, Yasuhiro Hisada, Akira Matsukawa, Kozo Shibata, Toshio Tanaka, Makoto Taniguchi, and Susumu Oi 696-699

Bioconversions in an Aqueous Two-Phase System Using Enzymes Immobilized on Ultrafine Silica Particles. Akihiko Kondo, Takafumi Urabe, and Ko Higashitani 700-703

Continuous Production of an Antibiotic Polypeptide (Nisin) by *Lactococcus lactis* Using a Bioreactor Coupled to a Microfiltration Module. Masayuki Taniguchi, Kazuhiro Hoshino, Hiroyuki Urasaki, and Michihiro Fujii 704-708

On-Line Continuous Measurement of the Oxygen Consumption Rate in Mammalian Cell Culture. Mutsumi Takagi and Kazuo Ueda 709-711

TECHNICAL NOTE

A New Cultivation System Operated under a Super High Magnetic Field. Kazumasa Okuno, Koji Tsuchiya, Takashi Ano, Makoto Shoda, and Masahiko Okuda 453-456

Gene Targeting in a *Klebsiella* sp. by Fusaric Acid Selection and the Use of Temperature Sensitive Replicon. Hiroyuki Sugino, Hiroyuki Azakami, Sumio Arai, and Yoshikatsu Murooka 712-715

LETTER TO THE EDITOR

Reassignment of the 37th and 119th Amino-Acid Residues in Thermolysin. Yoichiro Miki 457-458

1994 APPLICATION FOR MEMBERSHIP IN THE SOCIETY FOR FERMENTATION AND BIOENGINEERING, JAPAN

The Society for Fermentation and Bioengineering, Japan
Business Office, c/o Faculty of Engineering, Osaka University
2-1 Yamadaoka, Suita, Osaka 565, Japan
PHONE: 06-876-2731 FAX: 06-876-2773 (Country code 81)

In order to be active members of the Society, send the application form for admission to the Society for Fermentation and Bioengineering, Japan directly. Active member can receive each issue of this journal and Seibutsu-kogaku Kaishi in calender year (Jan.-Dec.) delivered by surface mail. Dues for active members from abroad are ¥10,000 per year. Memberships are initiated and renewed in January of each year. Unless there are directions to the contrary, membership granted prior to September 1 are credited to the current year and back issues of the selected publications for the current year are furnished, if available. Memberships granted after September 1 will become effective the following January.

NAME ☐Ms. ☐Mr. ☐Dr. _____ First _____ Middle Initial _____ Last

ADDRESS

(HOME)

PHONE

(OFFICE)

PHONE FAX

YEAR OF BIRTH

MAJOR FIELD OF STUDY

JOURNALS Please check: (Journal will be sent to home address)

☐ Please send me the JOURNAL OF FERMENTATION AND BIOENGINEERING (in English).

☐ Please send me the SEIBUTSU-KOGAKU KAISHI (in Japanese).

SIGNATURE OF APPLICANT

_____

PAYMENT IN JAPANESE 10,000 YEN MUST ACCOMPANY THIS APPLICATION. PAYMENT MAY ALSO BE MADE BY VISA, MASTERCARD OR EUROCARD BY ENTERING THE CARD DETAILS BELOW.

☐ VISA #
☐ MASTERCARD #
☐ EUROCARD #

EXPIRATION DATE: ___ / ___ MO YR

TODAY'S DATE ___ / ___ / ___ MONTH DAY YEAR

SIGNATURE _____ NAME AS IT APPEARS ON YOUR CREDIT CARD

NAME: